NCDOT TRAFFIC NOISE ABATEMENT POLICY

(Effective Through September 1, 2004)

The North Carolina Department of Transportation (NCDOT) Traffic Noise Abatement Policy provides for the evaluation of sound barriers or other mitigation measures (e.g., landscaping) for communities and facilities adversely impacted by noise from state and federal highways. NCDOT uses this policy to determine the need for noise abatement and the feasibility and reasonableness of abatement measures.

NCDOT noise abatement policy applies only to "Type I" projects for state, federal or federal-aid highway projects. NCDOT does not participate in "Type II" projects (retrofitting of existing roads, heavy maintenance projects, guardrail projects, rehabilitation projects and existing facilities).

Type I Projects

Sound barriers may be considered for new construction or reconstruction of highways. New construction is building a highway on a new location. Reconstruction involves physically altering an existing highway. The most common examples of reconstruction are: increasing the number of through-traffic lanes or substantially changing its vertical grade or horizontal alignment. Consideration of noise abatement as part of construction or reconstruction projects is mandatory whenever traffic noise impacts are predicted.

PREVENTING NOISE IMPACTS - Information for the Public and Local Officials

To prevent future noise impacts on currently undeveloped lands, the following system will be used:

Public information. During the development stage of a proposed highway project, area residents and local officials will be kept informed about the project. Meetings (both formal and informal) will be held to provide information as well as to gather comments, opinions and concerns from the public and local officials.

Public documents. Environmental documents prepared for the project will contain a list of areas that may be impacted by noise as well as proposals for sound barriers and/or other abatement measures.

Design Public Hearing. Proposed noise abatement measures will be presented and discussed at the Design Public Hearing. The walls shown on the design public hearing map will be based on preliminary design and a detailed noise analysis. NCDOT design staff will fine tune the designs during the right of way plan preparation process. The location of the barrier should remain essentially the same as shown in the design public hearing map.

Final determination. Noise abatement measures deemed reasonable and feasible by NCDOT staff will be shown on the design public hearing map. The opinions of first row property owners will be requested so that a final determination on abatement measures may be made.

Date of Public Knowledge. The "Date of Public Knowledge" of the location and potential noise impacts of a proposed highway project will be either a) the approval date of final environmental document, e.g.,CE, FONSI or ROD or b) the Design Public Hearing, whichever occurs later.

1. After this date, the federal and state governments are no longer responsible for providing noise abatement measures for new development within the noise impact area of the proposed highway project.

2. The criteria (e.g., trigger date) for determining when undeveloped land is "planned, designed and programmed" for development will be the approval of a building permit for an individual lot or site.

3. It is the responsibility of local governments and private landowners to ensure that noise-compatible designs are used for development permitted after the Date of Public Knowledge.

NCDOT will provide all traffic noise analyses to local government officials within whose jurisdiction a highway project is proposed. Specifically, environmental documents and design noise reports will contain noise tables identifying areas that may be impacted by traffic noise as well as other appropriate design information. Local officials should coordinate distribution of this information to residents, property owners and developers within the affected areas. Following this procedure will encourage planners, building officials, developers and others within affected communities to plan, design and construct noise-compatible development.

SOUND AND NOISE - Definitions and Measurements.

Sound is created when an object moves, causing vibrations or waves in air molecules. When vibrations reach our ears we hear sounds. Noise is defined as unwanted or excessive sounds. It is an undesirable by-product of our modern way of life.

Sound levels are measured in units called decibels (dB). Adjustment for the high and low pitched sounds an average person can hear is called "A-weighted levels" or dBA. Highway traffic noise is assessed using dBA measurements. Noise is further described by its average level over time. In noise abatement studies an "hourly equivalent sound level," or Leq(h), is the constant, average sound level that contains the same amount of sound energy over the time period as does the varying levels of actual traffic noise.

NOISE IMPACT DETERMINATION AND ABATEMENT.

Noise levels for which abatement must be considered and may be provided are defined by land use or activity category in Figure 1. Noise impacts are projected for the "design year," or the traffic levels anticipated 20 years after highway construction begins. Because these traffic levels

are estimates, noise impacts approaching these criteria are also considered. NCDOT uses an "approach value" of 1 dBA less than those shown in Figure 1.

Traffic noise abatement for NCDOT highway projects must be considered when either of the following two conditions exist:

1. The predicted design year noise levels approach or exceed those measurements shown for the appropriate activity category as shown in Figure 1.

OR

2. The predicted design year noise levels substantially exceed existing noise levels as defined below:

Existing Leq(h)	Increase
50 or less dBA	15 or more dBA
Greater than 50 dBA	10 or more dBA

Figure 1. Noise Abatement Criteria
Hourly A- Weighted Sound Level in Decibels(dBA)

Activity Category	Leq(h)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve and important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (Exterior)	Residences, churches, school, libraries, hospitals, motels, hotels, parks, picnic and recreation areas, active sports areas and playgrounds
C	72 (Exterior)	Developed lands, properties or activities not included in Categories A or B
D	Not Applicable	Undeveloped lands
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums

Depending on the existing noise levels, NCDOT uses both a 10 dBA and 15 dBA increase to define "substantially exceeding." This sliding scale allows a greater increase at a lower existing noise level before a "substantial" increase is defined. As sound barriers generally reduce volumes by 5 to 8 dBA, their use is usually not as effective in less noisy areas. A 10 dBA increase is judged by most people as a doubling of the loudness of sounds.

Noise abatement will generally not be considered for heavy maintenance, rehabilitation projects and existing conditions.

SOUND BARRIERS - Feasible and Reasonable.

After it has been determined to consider noise abatement as outlined above, several factors must be examined to determine if construction of sound barriers is feasible and reasonable. These factors include benefits to those impacted by noise, the cost of abatement, and overall social, economic and environmental effects of sound barrier construction.

Feasibility.

Feasibility deals primarily with design and engineering considerations. The following issues should be considered in order to determine feasibility:

1. Can a sound barrier be built given the topography of the location?

2. Can noise reduction ("insertion loss") provided by the wall be a minimum of 5 dBA, but preferably 8 dBA or more, for "design receptors" (first row receptors or properties immediately adjacent to the proposed barrier)?

3. Can this noise reduction level be achieved given site-specific access, drainage, safety or maintenance requirements?

4. Are other noise sources present in the area?

5. Unless special conditions exist and effective abatement can be provided, it is not considered feasible to provide noise abatement on non-controlled or partial access control highways.

Reasonableness.

Reasonableness is a more subjective measure. This consideration should show that good judgement and common sense were used in making a decision. A finding of reasonableness should include the following:

1. Sound barrier cost - The abatement measure should be cost effective. Cost effective is defined as $25,000 (construction costs at $15/s.f.) per each receptor effectively benefitted by a 5 dBA or greater noise reduction.

2. Barrier height - The height above ground level facing the receptor should not exceed a maximum of 7.5 meters, or approximately 25 feet.

3. Barrier scale - It generally will not be considered reasonable to construct a barrier unless the receptor is located a horizontal distance at least four times the wall height from the proposed barrier. Sound barriers can have an overwhelming visual impact on receptors located closer to the wall.

4. Difference between existing and future noise levels - It generally is not considered reasonable to provide abatement if the difference between existing and design year noise levels is 3 dBA or less, as this is considered a barely perceptible change.

5. Opinions of impacted residents - Support for the proposed sound barrier by design receptors ("first row" residents) must be documented. Noise barriers will not be constructed without support from 51% or more of the first row residents within a given area. The opinions of design receptors will be requested at formal and informal meetings and/or by mail depending upon the scope of the project.

6. Commercial areas - Unless special conditions exist, it generally is not considered reasonable to provide abatement for impacted businesses. Businesses usually prefer visibility from the highway rather than noise abatement.

7. Isolated receptors - Unless special conditions exist, it generally is not considered reasonable to provide noise abatement for isolated receptors. The cost of abatement versus the noise reduction benefits is usually excessive.

8. Clear recovery zone - A noise barrier will be located behind the vehicle clear recovery zone or incorporated into a safety device such as a Jersey barrier.

The factors listed above are not intended to be all encompassing. Rather, these are to illustrate some of the factors that should be considered in determining the feasibility and reasonableness of proposed abatement measures.

EARTH BERMS

Consideration should be given to providing earth berms for noise abatement purposes on projects that have earth waste and where sufficient right-of-way exists to construct the berm.

VEGETATIVE BARRIERS.

NCDOT 's Roadside Environmental Unit will review areas where abatement measures have been considered and not found to be reasonable, to determine if a vegetative barrier should be constructed as part of the project.
Vegetation that has sufficient height, depth and density of plant materials that it blocks views of the highway can also decrease traffic noise. Studies have shown that a 200 feet (61 meters) depth of dense vegetation can reduce noise levels by 10 dBA. It is often impractical to plant this quantity of vegetation to achieve such reductions. However, it does demonstrate the potential utility of retaining a vegetative buffer area between developed areas and highways.

NOISE BARRIER CONSTRUCTION, MATERIALS AND AESTHETICS.

The type of materials used in construction of sound barriers and other abatement measures should be an engineering decision based on economics, effectiveness and, to a limited degree, visual impacts. Visual impact considerations will ensure that the proposed barrier meets a basic

aesthetic level as well as a basic durability level so that excessive deterioration or corrosion will not occur.

The steel pile and concrete panel wall is NCDOT's standard noise wall.

Traditional highway construction resources pay for required noise abatement measures. Should a local government request that materials be used that are more costly than those proposed by NCDOT, the requesting entity must assume 100% of the additional cost.

If a local government insists on the provision of a noise abatement measure deemed not reasonable by NCDOT, a noise barrier may be installed provided the local government assumes 100% of the costs. These costs include, but are not limited to, preliminary engineering, construction and maintenance. In addition, local governments must ensure that NCDOT's material, design and construction specifications are met.